

arrival at Sydney, this party will be joined by several gentlemen who have had experience of eclipse work with Mr. F. K. McClean in Flint Island (1908) and Tasmania (1910). These are Messrs. J. Brooks, W. E. Raymond, and H. Winkelman.

2. *Expedition from the Joint Permanent Eclipse Committee*.—This party will be under the charge of Father A. L. Cortie, S.J., from Stonyhurst Observatory, who will be assisted by Mr. W. McKeon, S.J., and Father E. F. Pigot, S.J. Father Cortie's expedition also travelled by the *Otway* from London, and proceeded to Varau on board the *Encounter*. The equipment is as follows:—

- (1) Coronagraph of 20 feet focal length.
- (2) Coronagraph of 4 inches aperture.
- (3) Coronagraph of 4 inches aperture and 34 inches focus.

(4) 4-prism quartz train spectrograph for recording the ultra-violet spectrum of the chromosphere and corona.

(5) 6-inch Dallmeyer portrait lens arranged as a prismatic camera with a 7-inch objective prism of  $42^\circ$  angle.

3. A private expedition in charge of Mr. J. H. Worthington, who has had a special equipment made for this eclipse. His main instruments will include:—

(a) Quartz-rocksalt spectrograph of  $2\frac{1}{2}$  inches clear aperture and 4 feet focal length. With this will be used two objective prisms of quartz,  $60^\circ$  angle and  $2\frac{1}{2}$  inches high. The length of spectrum given by this combination is 8 inches from D to  $\lambda$  2600.

(b)  $3\frac{1}{8}$ -inch coronagraph with amplifying lens giving an equivalent focal length of 20 feet.

(c)  $2\frac{3}{8}$ -inch coronagraph of 4 feet focal length.

(d) 3-inch portrait lens coronagraph, 24 inches focal length.

Arriving at Vavau early in April, the various parties will have ample time to get their various instruments into the delicate adjustment which is necessary, provided, of course, that they are not seriously hampered by inclement weather. A telegram received from Sydney brings the welcome news that the officers and men of H.M.S. *Encounter* are enthusiastic in their anticipation of helping in the work of the various expeditions, and this augurs well for the success of the eclipse observations if good, clear weather is experienced.

The eclipse occurs at Vavau about 9.15 p.m. G.M.T. on Friday, April 28, totality lasting  $21\frac{1}{2}$  seconds, with the sun at an altitude of about  $43^\circ$ .

CHARLES P. BUTLER.

#### NOTES.

A COMMITTEE has been appointed for the purpose of raising in Amsterdam a suitable monument to the memory of the late Prof. van 't Hoff.

SIR J. J. THOMSON, F.R.S., has been elected a correspondent of the Paris Academy of Sciences in the section of physics.

THE Queensland Government recently appointed Dr. R. Hamlyn-Harris as director of the Queensland Museum, and has issued to him instructions to reorganise and put the museum on a proper footing.

SINCE the so-called "Daylight-saving" scheme was first put forward, we have pointed out that a change of custom as to the hours of opening of city offices would secure the better use of daylight without legislative action. We are glad, therefore, to see the announcement that in certain departments of the Board of Education the officials arrived at their offices on Monday at 9 a.m. instead of at 10 o'clock, and left at 4 p.m., an hour earlier than usual. The experiment proved such a success last year that the Board of Education authorities have decided to give it a wider trial during the forthcoming summer.

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It is proposed, in memory of the late Dr. Louis Olivier, founder of the *Revue générale des Sciences*, to publish a book, of from 250 to 300 pages, containing contributions from eminent men of science and letters who knew M. Olivier. The volume is to appear next August for the anniversary of the death of M. Olivier, and will be accompanied by a booklet containing his portrait, a biographical sketch, and a bibliography of his works. Subscriptions of 20 francs will secure a copy of both publications on ordinary paper, and 50 francs will entitle to copies on Japanese paper. Subscriptions may be sent to M. Louis Brunet, treasurer of the committee, 18 rue Chauveau-Lagarde, Paris.

THE Decimal Association has issued a circular with reference to the Colonies and the metric system of weights and measures. The most recent instance of the adoption of the metric system by a British colony is that of Malta, where an Ordinance has been passed making the system compulsory as from January 1 next, or such later date as the Governor may fix. It is understood by the Decimal Association that the question of the introduction of the metric system throughout the Empire will be brought forward by the Australian representatives at the forthcoming Imperial Conference. Accompanying the circular is an interesting summary of official reports on the metric system by Mr. J. H. Twigg, late of the Bengal Civil Service.

THE noteworthy flight of Lieuts. Erler and Markenthun from Berlin to Hamburg, and thence to Bremen, has provided a remarkable example of the immediate military value of the aeroplane. The officers started on March 28 soon after eleven o'clock, reaching Hamburg, 142 miles distant, about half-past six. Two halts, each of about two hours' duration, were made, one at Döllen in Mecklenburg, owing to the overheating of the motor, and the second at Ludwigslust. A wireless message was sent from the machine *en route*, which was received at Nauen, near Berlin. The altitude maintained—492 feet to 984 feet—was comparatively small for military purposes, and the flight was aided by a slight following wind. The next day the officers continued the journey to Bremen, covering the distance of 73 miles in a continuous flight of 1h. 15m., aided again by a following wind. The machine used was a biplane built to the designs of the military authorities, with the passenger's seat placed directly behind that of the pilot, but at a higher elevation to enable the observer to obtain an uninterrupted view in all directions. A dual control was fitted, allowing the observer to take charge in the event of the pilot becoming incapacitated from any cause.

A CENTRAL NEWS message from Christchurch (N.Z.) on April 1 states that the *Terra Nova* has arrived safely at Port Lyttelton from the Antarctic. During the meeting of the British party with the Amundsen Expedition cordial greetings were exchanged. As already announced, the *Terra Nova*, while following the Great Ice Barrier from the direction of King Edward Land with the view of landing the eastern exploration party somewhere near what was formerly known as Balloon Bight, found the *Fram* in the Bay of Whales. Captain Amundsen's sole object for the present is to reach the South Pole by way of the Beardmore Glacier, but he hopes, after having done so, to carry out the programme of Arctic exploration originally drawn up by him. His equipment includes 116 Greenland dogs and a sufficient number of sledges and skis. The *Terra Nova* on her return to McMurdo Sound left a message in the *Discovery* hut announcing the meeting with Captain Amundsen, and this message Captain Scott will find when he returns from his depôt-laying expedition.

in the south. The *Fram* is going to Buenos Aires, and will return to the Barrier in 1912.

THE Prehistoric Society of France will hold its seventh meeting at Nîmes on August 6-12.

Two lectures to engineers, on steel, will be given at the Institution of Mechanical Engineers on Tuesdays, April 11 and 25, by Dr. Walter Rosenhain, of the National Physical Laboratory.

THE Selborne Society has just issued a new prospectus which is well illustrated from photographs by members of the society, and includes pictures by several of the pioneers in nature photography. The prospectus contains a long list of branches and junior branches, with the rules of the society; copies can be obtained by prospective members on application to the honorary secretary at 42 Bloomsbury Square, W.C.

THE death is announced from Rotterdam of Pieter Cornelius Tobias Snellen, the distinguished entomologist, at seventy-seven years of age. A notice in *The Times* of April 5 gives the following particulars of his work:—Snellen devoted his attention almost exclusively to the Lepidoptera, and was one of the founders of the Entomological Society of the Netherlands, in the Transactions of which he published a valuable series of articles both on Dutch and foreign Lepidoptera from 1857 onwards. His work on the Lepidoptera of Holland, published in three volumes in 1867 and 1882, under the title of "*Vlinders van Nederland*," is the standard work on the subject, and is a model of completeness and accuracy. In addition to his European collection, Snellen brought together a very valuable foreign collection with the assistance of his friend M. C. Piepers, and other Dutch Colonial officials, and on materials thus acquired he based valuable papers on the Lepidoptera of West Africa, Java, Celebes, &c., and he also contributed a long paper on Lepidoptera to Veth's "*Midden-Sumatra*."

SIR CASPAR PURDON CLARKE, formerly director of the South Kensington Museum, and afterwards director of the Metropolitan Museum of Art in New York, died after a long illness on March 29. Sir Caspar acquired a considerable reputation by his knowledge of Eastern art, of which he was an enthusiastic and earnest student. On behalf of the South Kensington Museum he made several expeditions to the East for the collection of objects of Indian and Persian art, and the very remarkable display of Indian art and Indian architecture, which was one of the most attractive features of the Indian and Colonial Exhibition, 1886, was almost entirely due to the result of the journey which he made the previous year for the collection of suitable examples. After serving at South Kensington in various capacities, he followed Sir Philip Cunliffe-Owen as director of the museum in 1896. Nine years later—in 1905—he was attracted by the liberal offers of the authorities of that museum to the Metropolitan Museum of Art in New York. Illness compelled his abandonment of this post last year, and since his return to England he had been in very failing health.

THE Lötschberg Tunnel through the Bernese Alps was pierced early in the morning of March 31. It has taken four and a half years to bore the tunnel, and it will be another two years before it is open for traffic. The length is rather more than  $9\frac{1}{4}$  miles, and the tunnel ranks third among the great Alpine tunnels. The Simplon is  $3\frac{1}{4}$  miles longer, and the St. Gothard only about a quarter of a mile. One end of the new tunnel, which derives its name from the Lötschen Pass under which it runs, comes out at

Kandersteg, in the Bernese Oberland, the other at Goppenstein,  $17\frac{1}{2}$  miles from Brigue. The Lötschberg Tunnel differs from the other Alpine tunnels in not being straight, there being three curved lengths of 872 yards, 1222 yards, and 350 yards respectively, amounting in all to about one and one-third miles. This curved course was not part of the original plan, but was necessitated by the accident of July 24, 1908, when the Kander River was tapped and the water rushed into the workings, carrying with it a mass of rock, and killing twenty-five workmen. In consequence of this catastrophe, the total length of the tunnel was increased from 13,735 metres to 14,536 metres, or nearly half a mile. On the approach lines nearly one and a half millions sterling are being spent, while the tunnel itself was to cost 2,000,000*l.* To this sum, however, must be added the extra expenditure, amounting to 80,000*l.*, involved in lengthening the tunnel in the manner described. The chief difficulties encountered have been the hardness of the granite during a great part of the tunnel's course, which has involved heavy expenditure for blasting material, and the high temperature on the south side, which sometimes rose to more than 90° F.

THE Corrosion Research Committee of the Institute of Metals is now actively engaged in preparing for an elaborate series of investigations into the causes of the corrosion of brass condenser tubes. A special condenser is being constructed, which will contain forty-eight tubes, twenty-four of these being made of commercially pure brass, the remaining twenty-four tubes being made from brass containing a single selection from the following:—lead, tin, aluminium, manganese, or other materials at the discretion of the committee. Experiments will be made with various water speeds in the ratio of 0:1:2:3:4, speed 2 being an average speed used in practice. The circulating water to be used will be obtained from deep water at Formby, off Liverpool, in the first instance, and the plant for the corrosion research will be installed in the University of Liverpool, where the experiments will be under the direct supervision of Mr. G. D. Bengough. It is expected by the committee that the research will occupy many months before any definite conclusions can be reached, and it will undoubtedly be costly. An appeal was recently made by the committee for funds to carry on the research, and in response to it the total amount received was 242*l.* This is sufficient to enable the research to be commenced; but if the work is to be carried on properly the expenses will probably amount to not less than 300*l.* per annum. It is therefore hoped that additional donations to the Corrosion Research Fund will be speedily forthcoming. Donations should be sent to Mr. G. Shaw Scott, secretary of the Institute of Metals, at Caxton House, Westminster, S.W.

THE annual meeting of the Iron and Steel Institute will be held at the Institution of Civil Engineers, Great George Street, Westminster, on Thursday and Friday, May 11 and 12, commencing each day at 10.30 o'clock a.m. On the Thursday morning, the Bessemer gold medal for 1911 will be presented to Prof. H. Le Chatelier, and the Andrew Carnegie gold medal for 1910 will be presented to Mr. Félix Robin (Paris). The awards of the Andrew Carnegie research scholarships for 1911 will be announced, and a selection of papers will be read and discussed. The annual dinner of the institute will be held in the evening in the Connaught Rooms, Great Queen Street, W.C. On Friday, May 12, a further selection of papers will be read and discussed. The autumn meeting of the institute this year will, by the invitation of the Associazione fra gli Indus-

triali Metallurgici Italiani, be held at Turin, Italy, and an influential local reception committee has been formed, under the presidency of Mr. G. E. Falck, president of that association, to carry out the necessary arrangements. The meeting will commence on October 2, and with the subsequent tour organised in connection therewith will occupy about fifteen days from the time of leaving London until the return.

IN the report of the Royal Zoological Society of Ireland for 1910, the council states that, in spite of the bad weather of last summer, the money taken at the gates has not shown any serious decrease, this being largely due to an increase in the number of sixpenny admissions. On the other hand, the receipts from subscriptions and entrance-fees were distinctly lower. The lions continue to form one of the features of the menagerie, where they are now represented by twenty-one individuals. Lack of funds prevented extensive purchases during the year, but among the additions made in this manner attention may be directed to a young reindeer. The losses by death were serious, and an appeal is made for funds to establish and equip a hospital, by the aid of which it is hoped the mortality may in future be reduced.

IN a paper published in the February number of *The Victorian Naturalist*, Mr. J. A. Kershaw shows that the Australian eel (*Auguilla australis*) migrates to the ocean for breeding purposes in the same manner as its European relative, and that in turn the young elvers ascend the rivers until they find suitable dwelling places. As in Europe, these eels, when prevented by dams or on account of living in land-locked lakes or ponds, from reaching the sea by a direct route, will travel during freshets across flooded grass for long distances. Similarly, the elvers in Victoria not uncommonly ascend the streams in large "fares," when, in case of a barrier intervening, they make their way over comparatively smooth surfaces of rocks, as is well shown in the photographs illustrating the paper.

To the March number of *The Zoologist* Prof. McIntosh, of St. Andrews, contributes a sketch of the organisation and habits of the toothed whales. At the commencement the author endeavours to perpetuate the mistake that the "gigantic" mammoth was larger than living elephants, while later on he states that the teeth of the sperm-whale have been asserted to serve as a lure for prey, whereas he should have said the white lining of the mouth. He also asserts that the limbs of zeuglodonts are unknown, and implies that these animals are restricted to America. This being so, it is not surprising to find that he appears to be unfamiliar with the researches of Fraas, Dames, Stromer, and Andrews into the organisation of zeuglodonts, and the discovery of their apparent descent from creodonts. It is remarked that we are still in almost complete ignorance with regard to the slumber of cretaceans—if indeed they sleep at all; and an interesting reference is made to the belief of whalers that rorquals, after filling their lungs with air to the utmost extent, can remain in a quiescent condition beneath the surface of the water for eight or ten hours at a stretch.

THE scheme for the administration of the 40,000l. granted from the development fund to the Board of Agriculture and Fisheries for the encouragement of light-horse breeding, is now in full working order. It will be remembered that the objects of the grant are five-fold, namely, the award of premiums to stallions, awards for the purchase of half-bred working brood-mares to be stationed in

selected districts, free nominations for mares to be served by approved stallions, the purchase of stallions for resale, and the voluntary registration of stallions. The awards to stallions are to take the form of King's premiums and the Board's premiums, and in both cases owners will have to agree to their stallions serving not fewer than fifty mares if required, exclusive of those to which a free nomination has been given. In no case will service-fees be paid for more than ninety mares in any one year. It is estimated that about 200 working brood-mares can be purchased annually, and the free nominations for mares are expected to reach about 1400. By the purchase of stallions it is hoped to keep in the country a number of animals which would otherwise go abroad. One of the difficulties will be that the grant will increase the supply of hunters, cobs, &c., without creating a new market for this kind of stock, the demand for which is decreasing. The answer to this depends in some degree on whether the War Office is prepared to raise the stock of army horses to a war-footing.

IN *Meddelelser fra Kommissionen for Havundersøgelser*, Serie Fiskeri, Bind III., No. 8, Dr. A. C. Johansen gives a summary account of the recent investigations on plaice and plaice fisheries in Danish waters, treating separately of the fisheries in the North Sea, the Skagerak, and the northern Kattegat. The present memoir gives a very useful and comprehensive summary of the previous reports which have been issued on the same subject. It includes an account both of the market statistics of plaice landed and of the special scientific investigations and experiments which have been carried out. The market conditions in Denmark are exceptional, owing to the fact that the chief demand is for fish which are landed alive. This influences the method of fishing, the plaice being caught in seine nets instead of in trawls. The fish thus caught are for the most part alive when captured, and as there is a size limit (25·6 cm.) below which they are not allowed to be landed, and the fish under this size are returned to the sea, the actual destruction of small fish is insignificant. It appears that since the introduction of the size limit the Danish plaice fisheries in the North Sea have increased, and the report speaks in favour of an international size limit for plaice for all countries carrying on fisheries in the North Sea.

THE Legislature of Montana, since January 20 last, has introduced and enacted into a State law a measure that converts the famous "Hell Creek Bad Lands" country into a State game preserve. Primarily it is for the benefit of the prong-horned antelope, mule deer, and mountain sheep still surviving in that wild and picturesque region; but it is reasonably certain, also, that in the future a nucleus of American bison will be added. The region fronts on the Missouri River, and it lies about 100 miles north by west of Miles City. The total area of the preserve is about 100 square miles. About three-fourths of it consists of very deep and rugged bad-lands, made by the waters of Snow Creek, Hell Creek, and other streams. The remaining fourth of the tract contains some high-level grass lands that can support a herd of perhaps a thousand bison. On the eastern side of the preserve lies the fossil region, now known widely as "the Hell Creek formation," discovered in 1902 by Messrs. W. T. Hornaday and L. A. Huffman, out of which have come the great lizard (*Tyrannosaurus rex*) and the giant three-horned dinosaur (*Triceratops brevicornis*). The new preserve contains a small band of mountain sheep. It is intended, eventually, to ask Congress to make Snow Creek a national preserve.

In a recent issue of *The Agricultural News*, the journal of the West Indian Department (vol. ix., No. 223), attention is directed to the possibility of growing *Castilloa* rubber in Jamaica. It is considered that *Castilloa guatemalica* is better suited to the local conditions than *C. costaricana*, but it is stated that a drought-resisting *Castilloa* occurs on the Pacific side of Costa Rica which might prove useful, and is to be tried. The tree should be planted as a separate crop, and not as a shade crop for cacao, if the best results are desired.

THE report on the Local Department of Agriculture at Barbados, 1909-10, deals mainly with sugar-cane and cotton experiments. There has been a falling off in the area planted in cotton owing to various discouragements, which, it is stated, would have been greater but for the efforts of the Department. The production and introduction of useful food crops has been continued, with promising results, and a beginning has been made with an export trade to Great Britain. Bananas have been shipped here, and also mangos and Avocado pears, but unfortunately some of the two last crops reached London in bad condition. Sweet potatoes and yams were also sent; from the experience gained it is clear that much has to be learned in regard to time and method of shipment, &c.

DR. THEILER, of the Transvaal Agricultural Department, showed some time ago that redwater is caused by *Piroplasma bigenimum*, and devised a system of inoculation that has proved very successful in rendering immune the South African cattle. But both in the Transvaal and in Cape Colony considerable trouble has arisen when imported cattle have been inoculated, so many as 33 per cent. of the animals being lost in the experimental trials. The problem is discussed in a recent issue of *The Agricultural Journal of the Cape of Good Hope* (No. 4, vol. xxxvii.) by Mr. R. W. Dixon, who recommends that only young animals less than a year old should be imported if possible, as these resist the ill-effects of inoculation better than older animals. It is further recommended that the importation should be in winter or early spring, at which time tick infestation is in abeyance, and redwater, whether natural or artificially induced, is always milder in cold than in warm weather.

THE bush-fire problem in thinly populated countries is discussed by Mr. T. S. Marshall in the *Journal of the Department of Agriculture of South Australia* (vol. xiv., No. 3). Right through Australia, he states, millions of acres of forest country occur in which many of the trees are ring-barked, others are hollow to the core, numberless dead trees, inflammable as tinder, lie on the ground, while the thick grass and undergrowth become very dry. The fires are started through careless throwing down of burning wax matches—surely the most dangerous of all matches in a forest—by neglect of camp and other fires, by sparks from engines, &c. As a safeguard, breaks are prepared round farm holdings by ploughing a strip one, two, or sometimes more chains wide all round, and keeping it carefully free from growth. In better settled districts brigades are organised and provided with specially constructed carts for sprinkling the ground in front of the fire, and so making a break, or putting out logs and fences that have begun to burn.

THE soy bean (*Soja hispida* or *Glycine hispida*) has during the last two years come into prominence as a cattle food in England, and a certain number of experiments have been made to compare it with linseed and with cotton-seed cakes, which have hitherto been the standard

purchased foods employed here. A report on two experiments made by Mr. W. Bruce, of the Edinburgh and East of Scotland College of Agriculture, has recently been issued, and the results indicate that soy-bean cake may be inferior to linseed cake for purposes of fattening bullocks. As Mr. Bruce points out, however, the result cannot be considered final. Feeding experiments are liable to many sources of error, and it is not unusual to find that a result obtained in one experiment is not confirmed on repeating the trial elsewhere. Whether the soy-bean cake proved less profitable than the linseed cake is not clear; in one of the two experiments it proved the more expensive food for making flesh, but, in the butcher's opinion, the flesh was worth more.

IN *The Agricultural Journal of British East Africa* (vol. iii., part ii.), published by the Agricultural Department, Nairobi, is an article on the rainfall of Nairobi giving diagrams, but, unfortunately, few or no figures, to illustrate various phenomena indicated by the records from June, 1899, to December, 1909. The rainfall is at a maximum in April, when it is 8 inches on the average, though the amount has been so high as 16 and so low as 1½ inches; it then falls, and during the months July, August, and September it averages less than an inch a month, the variation being from drought to 2 inches. It then rises to November, when there is a second maximum at 5 inches, the variation being from less than 2 to nearly 8. According to a native tradition, the rainfall runs in cycles of nine or ten years, each of which cycles terminates with a drought. The records have not gone on long enough to test the validity of this tradition. In another article attention is directed to the loss of power in internal-combustion engines at high altitudes. The writer states that he is working engines at an altitude of some 5000 feet above sea-level, and discusses methods by which the loss, due to diminished atmospheric pressure, may be reduced.

A CONTRIBUTION to the morphology of the Nyctaginaceæ, by Dr. H. Fiedler, published in Engler's *Botanische Jahrbücher* (vol. xlv., part v.), is concerned chiefly with the inflorescence modifications and floral diagram variations, from which the author draws conclusions as to the phylogenetic sequence of the included tribes and genera. The tetracyclic character of the flower with two staminal whorls, characteristic of the Centrospermæ, is confirmed, and evidence for two or more lines of development in the family is adduced.

Two useful compilations by Mr. P. C. Standley relative to the botany of New Mexico are published in vol. xiii., part vi., of *Contributions from the United States National Herbarium*. The first is an annotated list of type species from New Mexico, together with their localities; to these is added a summary of the itineraries of early collectors, a descriptive list of type localities, and a map of the territory of New Mexico on which the localities are marked. The number of species enumerated is 690, of which one-fifth were collected in the vicinity of Santa Fe, chiefly by A. Fendler in 1847. The second article is a bibliography of New Mexican botany.

A REPORT by Mr. H. N. Thompson, the conservator of forests in southern Nigeria, on his tour through the western districts of Meko and Shaki, provides the subject of a publication by the legislative council of the colony. The forests inland are chiefly open savannah or park-like, in which deciduous-leaved trees predominate; in moist situations along the banks of streams they become denser,

and contain more evergreen species. Extensive areas of the so-called black cotton soil form a special feature that is rare in tropical West Africa. *Pseudocedrela Kotschy* is the most important tree, both in quantity and quality; *Lophira alata*, the West African oak, and *Pterocarpus erinaceus* are fairly common, and could be increased by judicious fire-protection and cultivation. *Azelia africana* is more localised, and *Khaya senegalensis* grows mainly above the eighth parallel.

A REPORT on the eruption of Taal volcano (Luzon) of January 30 has been issued by the Rev. M. Saderra Masó, assistant director of the U.S. Weather Bureau in the Philippine Islands. The volcano rises from Volcano Island in Lake Bombon, lies about 39 miles south of Manila, and is 996 feet in height. On the night of January 27-28 the volcano began to emit black smoke from its main crater instead of the usual clouds of white steam. This was accompanied by rumblings and earthquakes. During the next two days the explosions and earthquakes increased in strength and frequency until about 2.20 a.m. on January 30, when a tremendous explosion occurred, which is said to have been heard at a distance of 250 miles from the volcano. A huge black cloud issued from the crater, and there was a heavy fall of boiling mud, which destroyed all the houses and vegetation in Volcano Island and along the western and north-western shores of the lake to a distance of 10 miles from the crater, and caused the loss of more than 1250 lives. Along these shores the mud formed a layer 2 or 3 feet in thickness. The opposite shores escaped with little or no fall of mud, the wind having been from the south-east. The damage was increased by the waves produced in the lake, which reached a height of 10 feet. The rush of air towards the volcano was perceptible for many miles. At Batangos, 17 miles distant, an abrupt fall of 2 mm. in the atmospheric pressure was registered. Volcanic dust was carried so far as Manila. Earthquake shocks, though never of destructive intensity, were extremely frequent, nearly a thousand having been recorded at Manila from January 27 to February 7, when the eruption ended and the ground ceased to tremble.

THE summary of the weather in the several districts of the United Kingdom for the first quarter of the current year, as comprised by the thirteen weeks ended April 1, has just been issued by the Meteorological Office. The mean temperature for the period was nowhere very different from the average, and the record of absolute temperatures was not at all exceptional. The highest temperature in any district during the three months was 63°, which occurred both in the east and south-west of England. The lowest temperature was 11° in the east of Scotland and 13° in the south-west of England. The aggregate rainfall for the period was less than the average in all districts except in the east of England, where the excess for the three months was 0.63 inch. The greatest deficiency was 3.19 inches in the south of Ireland, and in the north of Ireland it was 2.74 inches. The greatest deficiency in any of the English districts was 1.88 inches, in the south-west of England. The largest absolute measurement for the period was 14.42 inches in the north of Scotland, the smallest 3.99 inches in the north-east of England. The number of rainy days was nowhere very different from the normal; the highest number was 58 days in the north of Scotland, the lowest 42 days in the Midland counties. The hours of bright sunshine were in good agreement with the normal; the longest duration was 269 hours in the Channel Islands, the shortest 196 hours in the Midlands. At Greenwich the mean tempera-

ture for the three months was in absolute agreement with the average; the rainfall was 0.61 inch less than usual, whilst the bright sunshine was 25 hours deficient. For the six months October to March inclusive, which comprises the whole winter, the mean temperature at Greenwich was 43.0°, which is 0.6° in excess of the average. October and December were decidedly warm months, whilst November was decidedly cold. The lowest shade temperature at Greenwich during the winter is 22°, which occurred both in November and February. Out of 182 days there were 94 days with the temperature above the average, and frost occurred on 37 nights. There were 99 days with rain, yielding a total of 13.31 inches, which is 1.49 inches more than the average; November, December, and March were wet. The total duration of sunshine in the six months was 319 hours, which is 63 hours fewer than the average.

THE meteorological charts of the Atlantic and Pacific Oceans for March and April published by the U.S. Weather Bureau contain useful notices (1) on West India hurricanes, which usually occur between July and October. Particulars are given of some of the more destructive storms, with remarks on the premonitory signs of the approach of tropical hurricanes generally. The tracks of those which occurred in 1900-9 are laid down on charts for separate months. The storms are liable to appear in any part of the region between lat. 7° and 31° N., and east of the ninety-fifth meridian, and to recur at any point between far to the east of the Bahamas and the west coast of the Gulf of Mexico. (2) Cyclones and anticyclones. The first clue to the rotatory character of storms is attributed to Benjamin Franklin, in 1747. As he was unable to observe an eclipse of the moon at Philadelphia owing to stormy and cloudy weather, while his brother at Boston experienced clear weather, he made inquiries as to the behaviour of the storm in question, and as a result of the investigation he came to important conclusions on the movements of storms in general. Some useful explanations are given by the author of this notice of the conditions at work in weather changes, and of the origin of storms.

THE *Verhandlungen der Deutschen Physikalischen Gesellschaft* for February 28 contains an account of a theoretical and experimental investigation of the best practical method of winding the coil of a needle galvanometer, by Dr. W. Volkmann. Maxwell showed long ago that the wire should increase in diameter as the windings get farther from the centre, and Volkmann finds that the nearest practical approach to this is to make the diameter of the wire used for successive portions of the coil increase in geometrical progression. The loss of efficiency due to this step by step change is proportional to the ratio of the step. The winding should be stopped when the loss due to stopping it is equal to that due to the ratio of the step. By finding experimentally the deflection due to single turns of various diameters, and in different positions, and dividing the deflections by the lengths of the turns, he finds that the best shapes of the parts of the coil are not quite those given by Maxwell, the deviations being greatest for the parts near the needle. With the new winding a coil of only 3.7 cubic centimetres produced the same deflection as a coil of 47 cubic centimetres wound on the old lines. Each coil consisted of four parts, and had a resistance of 5.5 ohms.

The *Scientific American* for March 18 is devoted to cement and its uses. An interesting article by M. L. Davey gives particulars of methods of saving trees which have partly rotted by means of cement fillings. Once

decay has started in a tree, its progress is rapid. Decay attacks and disintegrates the dormant tissues first, and gradually works outward. Cement in trees fulfils the three-fold purpose of stopping decay, serving as a structural support, and providing a surface over which the bark may heal. Tree surgery may be likened to dentistry; all existing decay must be removed, and means taken to prevent further decay; the cavity must be prepared so that the filling will stay permanently in place, and all foreign substances must be excluded. Chisels and gouges are employed to remove existing decay, which must be followed throughout limbs and trunk so far as it goes. Corrosive sublimate or a similar solution may then be used to destroy any remaining fungi. The walls of the cavity must then be thoroughly waterproofed to protect the wood. Before filling in the cement, the cavity must be well braced, if of considerable size, with steel ribs or truss rods. Skill is required in this matter, so as to allow for the natural swaying of the tree. Water is excluded by cutting a "water-shed" at the edge of the cavity, to which an adhesive waterproofing material is applied. The filling must be under the edge of the bark at every point in order to permit of the bark healing over the filling.

MESSRS. MACMILLAN AND CO., LTD., have published an Index to vols. xi.-xx. (1901-10 inclusive) of *The Economic Journal*, the journal of the Royal Economic Society, which is edited by Prof. F. Y. Edgeworth, assisted by Mr. H. B. Lees Smith, M.P. The index has been prepared by Miss Ethel R. Faraday.

In our issue of December 26, 1907 (vol. lxxvii., p. 172), attention was directed to Mr. Nasarvanji Jivanji Ready-money's "Science of Nature-History." The author has sent a copy of a reissue of his work—in which he has modified the title and added an introductory page—and also a pamphlet entitled "A Programme of Education," in which he commends the heuristic method of teaching.

MESSRS. BAILLIÈRE, TINDALL AND COX announce that the new edition of Green's "Pathology" will be ready for publication by the end of the month. The work has again been revised by Dr. Bosanquet, much new material added, and rearrangement of subjects made. Its format has also been modified for inclusion in the "University Series of Manuals," which contains such volumes as Stewart's "Physiology" and Dawson Turner's "Medical Electricity."

#### OUR ASTRONOMICAL COLUMN.

HALLEY'S AND FAYE'S COMETS.—Dr. Max Wolf records, in No. 4486 of the *Astronomische Nachrichten*, recent observations of both Halley's (1909c) and Faye's (1910e) comets at the Königstuhl Observatory. On March 19 the former was still an easy object for the large reflector, its magnitude being about 14.0; no nucleus was visible, the comet appearing as a round nebulous disc of about  $\frac{1}{4}$  minute diameter.

Faye's comet on the same evening was fainter than Halley's, its magnitude as a whole being about 15.0. A sixteenth-magnitude nucleus of about 10" diameter was situated nearer to the southern edge of the circular nebulous disc; the comet is still an easy object to photograph with the large reflector; an observation on March 23 gave the magnitude as 14.5.

COMET 1910a.—An excellent photograph of comet 1910a, taken on January 28, 1910, with a Voigtländer "Dynar" objective by Dr. Karl Böhlín at the Stockholm Observatory, is reproduced as a plate in No. 2, vol. xxxiii., of *The Astrophysical Journal*. The principal tail extends to a length of 18°, and is bifurcated at its extremity; in addition, there issues from the slender head a secondary tail 2° long.

Prof. Riccò gives an account of the Catania observations, photographic and spectroscopic, of this comet in No. 2, vol. xi., of the *Memorie di Astrofisica ed Astronomia*. He reproduces several drawings and photographs showing the magnificent main tail and the small secondary one. In regard to the latter, he suggests, with great reserve, that its formation may have been an effect of the proximity of the comet to Venus, the distance separating them on January 27, 1910, being about 133 million kilometres. The Catania drawings for January 22 and 23 show the nucleus to be on the outer, convex edge of the U-shaped tail.

A PROPOSED METHOD OF DETERMINING SPECTRAL TYPES QUANTITATIVELY.—On January 24, 1907, we noted in these columns (NATURE, No. 1043, vol. lxxv., p. 304) the results obtained by Dr. Sebastian Albrecht, then of the Lick Observatory, from a study of the varying intensities of certain lines of compound origins found whilst measuring spectrograms for the determination of radial velocities. Briefly, the author found that, in consequence of the variation in intensity of the components from one spectral type to another, there was a progressive variation of the apparent wave-lengths of the compound lines. Further, it was suggested that, by inverting the problem, it might be possible to determine the finer differences in spectral type by careful measurements of the wave-lengths.

In the current number of *The Astrophysical Journal* (vol. xxxiii., No. 2, March, p. 130) Dr. Albrecht, now at the Córdoba Observatory, gives the preliminary results of such an investigation. One of the chief difficulties is to state definitely and numerically the intervals between the several spectral types F, G, K, and M of the Draper classification, but this is overridden by arbitrarily taking them as equal, and making Ma and Mb one-tenth of an interval on either side of M. Curves were then constructed with type-intervals as abscissæ and variation of wave-lengths as ordinates, so that accurate measurements of the wave-lengths in the spectrum of the star under discussion would show at once the exact position of that star in the classification; generally speaking, these curves show that the changes in wave-length are regularly progressive from type F to type M.

To illustrate the application of the method, eight stars were chosen, and the selected variable wave-lengths were measured in each, the results being recorded as weighted departures, in tenths of an interval, from the nearest main type. A considerable variation is shown among the individual results from each of the selected lines, although the probable error of the final result from all the lines is, in each case, not great; also, the accordance with the Draper classification is fairly good. Dr. Albrecht considers that the scheme is workable, and that when further developed it will afford a ready method of determining quantitatively the spectral type of the stars observed. He also suggests that in order to avoid special measurement a number of his selected compound lines should be included in all future measurements of spectrograms for the determination of radial velocity; it would appear, however, that for radial-velocity work it is better to use the purest lines possible.

MERIDIAN OBSERVATIONS AT THE ROYAL OBSERVATORY, BELGIUM.—The second part of vol. xii., of the *Annales de L'Observatoire Royal de Belgique* contains the detailed results of more than 2000 observations made with the Repsold meridian circle during 1909-10 (June), by MM. Philippot, Delporte, and Jamar. The principal object was to complete the observations of the *étoiles de repère*, but observations of the sun, the moon, and the planets, and of comparison stars for comets and for use in determining the movements of certain double stars in Burnham's general catalogue, were also made. Since August, 1909, a Repsold registering micrometer has been employed, and during the same year important modifications were made in the meridian room; among other alterations, the foundations of the pillars were encased with insulating material to prevent variations introduced by changes of temperature.

The volume also contains an interesting account of a comparative study of the errors of two chronographs, one by Gautier, the other by Dent.